編號： 100

國立成功大學 109 學年度碩士班招生考試試題

系　　所：土木工程學系

考試科目：工程經濟

考試日期：0210，節次：2

※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1　回答下面問題：(20%)

1.1　解釋下列名詞：Sunk Cost, Retaining Earning, Book Cost

1.2　若A方案的內部投資報酬率為 18%，利潤現值分析為 9,000 元；B方案的內部投資報酬率為 15%，利潤現值分析為 10,000 元；哪一個方案較佳？兩種分析方法是否有產生不一致的結果？為什麼？

1.3　折舊常應用在工程經濟分析上，當作減稅上的效益，列出三個資產可折舊的條件。

1.4　A bank assesses the risk of loaning a real estate developer for the construction cost on an apartment project and comes up with the following statement "The loan can be recovered if the developer reduces 20% of the project selling price and sells 30% of the project worth". If the bank usually grants 50% of the construction cost, what is the construction cost of the apartment project (in terms of selling price)?

2　Consider the end-of-year geometric sequence of cash flow in Fig. 1 and determine the PW and AW equivalent values. The rate of decrease is 20% per year after the first year, and the interest rate is 12% compounded monthly. (10%)

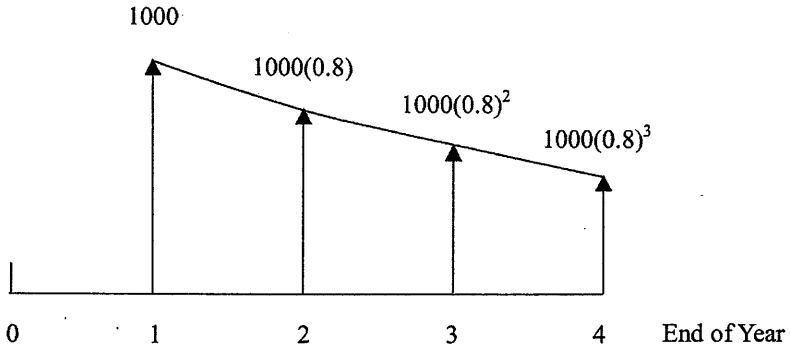

Fig. 1

3　A bridge is to be constructed now as part of a new road. Engineers have determined that traffic density on the new road will justify a two-lane road and a bridge at the present time. Because of uncertainty regarding future use of the road, the time at which an extra two lanes will be required is currently being studied. The two-lane bridge will cost $250,000 and the four-lane bridge, if built initially, will cost $500,00. The future cost cost of widening a two-lane bridge to four lanes will be an extra $350,000 plus $40,000 for every year that widening is delayed. The minimum attractive rate of return used by the department is 15% per year. In addition, based on prediction of the traffic density, the times at which the future four-lane could be required are 3, 5, and 7 years. When should the bridge be widen that provides the most economically solution. (20%)

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4 Suppose that an asset has a cost basis of $50,000 and a salvage value of $15,000 at the end of 5years. This asset is depreciated by the Straight-Line method. The effective income tax rate is 40 % and the after-tax MARR = 10%. If the company is going to sell this asset after 3 years at the market value of $35,000. (20%)

4.1 What is the minimum profit per year this equipment should produce to breakeven the investment?

4.2 If the inflation rate if 2% per year, what is the minimum profit per year this equipment should produce to breakeven the investment?

5 You bought an apartment which was on a 20-year 2.4% nominal interest rate mortgage of NT$6,000,000 from a local bank. The payment is due every 6 months. However, you are allowed to pay back only the interest due for the first 3 years (grace period) then make the semi-year payments thereafter. You have paid back the loan for 5 years including the 3 years of grace period. (30%)

5.1 What is the interest due every 6 months for the first three years? What is the semi-year payment that you are asked to make after three years of grace period?

5.2 What is the total interest that you have paid in 5 years? What is the remaining principal after 5 years of payments?

5.3 Another bank 168 offers you a bargain to transfer your loan at the nominal rate of 2.16% (pay monthly) for the remaining 15 years with a transfer fee of NT$60,000. You also get an opportunity that would give you 12% return on the investment per year. Will you transfer your loan? Why or why not? Show your calculation.

To Find:	Given:	Factor by Which to Multiply "Given"	Factor Name	Factor Functional Symbol
For single cash flows:				
F	P	$(1+i)^N$	Single payment compound amount	(F/P, i%, N)
P	F	$\frac{1}{(1+i)^N}$	Single payment present worth	(P/F, i%, N)
For uniform series(annuities):				
F	A	$\frac{(1+i)^N-1}{i}$	Uniform series compound amount	(F/A, i%, N)
P	A	$\frac{(1+i)^N-1}{i(1+i)^N}$	Uniform series present worth	(P/A, i%, N)
A	F	$\frac{i}{(1+i)^N-1}$	Sinking fund	(A/F, i%, N)
A	P	$\frac{i(1+i)^N}{(1+i)^N-1}$	Capital recovery	(A/P, i%, N)